References

1. Click RL, Holmes DR Jr, Vlietstra RE, Kosinski AS, Kronmal RA. Anomalous coronary arteries: location, degree of atherosclerosis and effect on survival—a report from the Coronary Artery Surgery Study. J Am Coll Cardiol 1989;13:531–7.

2. Roberts WC. Major anomalies of coronary arterial origin seen in adulthood. Am Heart J 1986;111:941–63.

Reply

We appreciate the comments of Hobbs and his drawing attention to the difficulties of angiographic recognition of various anomalies. In our view, the course of the left anterior descending coronary artery in Figure 4 does not resemble that of a conus branch. Indeed, its initial superior and then directly lateral course to the left, although admittedly unusual, is more consistent with passage between the great vessels than with anterior passage. A path anterior to the pulmonary trunk would show a much more anterior looping (1). Figure 5 may indeed represent a septal course for the anomalous left anterior descending branch. The exact frequency of this relatively recently described anomaly is not yet substantiated (2).

Debate regarding the presumed course of anomalous vessels is compounded by a lack of ability to check the real answer for what is seen at angiography. This is a special problem in the Coronary Artery Surgery Study (CASS) where documentation at autopsy or surgery was not generally available. A clearer delineation of the great vessels is possible using intravascular catheters or superimposed contrast injections (3). These opportunities were also not available in CASS.

Extrapolation from other reported cases that have pathologic correlation, or from postmortem "mock-ups," is only partially helpful because of the great diversity in the angiographic appearance of coronary arteries. The diverse characteristics of even normally distributed coronary arteries remind one not to expect precise uniformity for those arteries that are anomalous.

It was the recognition of these difficulties that encouraged us to keep our classification as simple as possible and to limit our conclusions on the anomalous vessel course, and rather focus on the prevalence, origin and disease of these important angiographic findings.

ROGER L. CLICK, MD
Mayo Clinic
Rochester, Minnesota 55905

References

1. Chaitman BR, Lespérance J, Saltiel J, Bourassa MG. Clinical, angiographic, and hemodynamic findings in patients with anomalous origin of the coronary arteries. Circulation 1976;53:122–31.

2. Roberts WC, Dicicco BS, Waller BF, et al. Origin of the left main from the right coronary artery or from the right aortic sinus with intramyocardial tunneling to the left side of the heart via the ventricular septum: The case against clinical significance of myocardial bridge or coronary tunnel. Am Heart J 1982;104:303.

3. Moodie DS, Gill C, Loop FD, Sheldon WC. Anomalous left main coronary artery originating from the right sinus of valsalva. Pathophysiology, angiographic definition, and surgical approaches. J Thorac Cardiovasc Surg 1980;80:198–205.

Restrictive Ventricular Physiology as Demonstrated by Doppler Echocardiography

In their study of patients with restrictive ventricular filling demonstrated by pulsed Doppler echocardiography of central venous flow, Appleton et al. (1) observed that the most typical finding was diminished velocity, absence or inversion of forward flow during systole, with a predominance of diastolic forward flow. They view these characteristics as the result of atrial enlargement and decreased function occurring over time.

The same characteristics of central venous flow were reported by Sivaciyan and Ranganathan (2) in patients with cardiomyopathy who had elevation of right atrial pressures and right ventricular end-diastolic pressures, and also in patients with constrictive pericarditis and tricuspid insufficiency. An identical pattern of flow was found by Wyse et al. (3) by transcutaneous Doppler ultrasound of the jugular vein in patients submitted to the Mustard technique.

We reported (4) the same type of flow in 10 patients submitted to atrial baffle repair of transposition of the great arteries as assessed

Figure 1. Hepatic vein flow after atrial baffle repair in patients with transportation of the great arteries.